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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Masatake OKUMURA

Serial No. :

Filed : Concomitantly herewith

For : METHOD OF CLEANING AN ULTRAPURE WATER SUPPLY SYSTEM

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Lori Valdes

In the event that this Paper is late filed, and the necessary petition for extension of time is not filed concurrently herewith, please consider this as a Petition for the requisite extension of time, and to the extent not tendered by check attached hereto, authorization to charge the extension fee, or any other fee required in connection with this Paper to Account No. 06-1378.

PRELIMINARY AMENDMENT FILED CONCOMITANT WITH APPLICATION

Assistant Commissioner for Patents
Washington, D.C. 20231

S I R :

Please amend the application as follows:

IN THE SPECIFICATION:

Page 1, line 1, between the title and "TECHNICAL FIELD", insert the following:

--This application is a national phase application of International Application PCT/JP01/06842 filed August 9, 2001.--

Page 22, line 25, replace the heading which appears on said line with the following heading:

--**Evaluation of Examples 1-4 and Comparative Examples 1-2**--

Page 22, line 26 through page 23, line 10, replace the original paragraph with the following paragraph:

--As is clear from FIG. 5, in the ultrapure water supply system cleaned by the cleaning methods according to Examples 1 to 3, the number of fine particles in the ultrapure water produced by the system dropped to a level lower than an allowable upper-limit value (1/mL) before a whole day passed since the start of operation of the system following the completion of the cleaning. Namely, the cleaning methods of Examples 1 to 3 proved to have high fine particles removing capability. On the other hand, in the system cleaned by the method according to Comparative Example 1, more than eight days were required for the number of fine particles in the ultrapure water produced by the system to drop to a level lower than the allowable upper-limit value, and thus, it was found that the cleaning method of Comparative Example 1 had poor fine particle removing capability.--

Page 23, lines 11-23, replace the original paragraph with the following paragraph:

--Also as seen from FIG. 6, in Examples 1 to 3, the time required for the TOC of the ultrapure water produced by the system to drop to a level lower than an allowable upper-limit value (1 μg/L) was shorter than a whole day as counted from the start of operation of the system, proving that the cleaning methods of Examples 1 to 3 also have excellent organic matter removing capability. On the other hand, in Comparative Example 1 it took four to five days for the TOC to decrease to a level

lower than the allowable upper-limit value, and it was found that the cleaning method of Comparative Example 1 had poor organic matter removing capability.--

IN THE CLAIMS:

Please amend the following claims:

6. (Amended) The cleaning method according to claim 2, wherein the basic solution is an aqueous solution of ammonia or ammonium salt, or an aqueous solution of alkali metal hydroxide, or a mixture of the aqueous solution of ammonia or ammonium salt and the aqueous solution of alkali metal hydroxide.

7. (Amended) The cleaning method according to claim 2, wherein the basic solution is pure water or ultrapure water in which alkaline gas is dissolved.

Please add the following claims 8-11:

8. (New) The cleaning method according to claim 4, wherein the basic solution is an aqueous solution of ammonia or ammonium salt, or an aqueous solution of alkali metal hydroxide, or a mixture of the aqueous solution of ammonia or ammonium salt and the aqueous solution of alkali metal hydroxide.

9. (New) The cleaning method according to claim 5, wherein the basic solution is an aqueous solution of ammonia or ammonium salt, or an aqueous solution of alkali metal hydroxide, or a mixture of the aqueous solution of ammonia or ammonium salt and the aqueous solution of alkali metal hydroxide.

10. (New) The cleaning method according to claim 4, wherein the basic solution is pure water or ultrapure water in which alkaline gas is dissolved.

11. (New) The cleaning method according to claim 5, wherein the basic solution is pure water or ultrapure water in which alkaline gas is dissolved.

REMARKS

The amendments to the claims removes all multiple dependent claims without changing the scope of coverage.

The amendment to page 1 inserts the Section 120 requirement.

The amendments to pages 22 and 23 are the obvious correction of an obvious error because the specification does not disclose an Example 5.

The amendment to the drawing is supported by the disclosure on page 21, line 1.

The amendments hereinbefore with the exception of the page 1 insert, are handmarked on the attached copies of pages 22, 23, 24 and 25.

Entry of the present amendment is solicited.

Respectfully submitted,

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detached from the housing and was immersed in the same cleaning liquid 8 as used in Example 1 for two hours with ultrasonic waves applied to the cleaning liquid 8 to vibrate the same, thereby cleaning the ultrafiltration membrane. Subsequently, with the ultrafiltration membrane attached to the housing, the ultrapure water was caused to flow through the housing, and the number of fine particles contained in the ultrapure water passed through the ultrafiltration membrane was measured by the same method as used in Examples 1 to 3. The measurement results are shown in FIG. 7.

Comparative Example 1

Using warm water of 40°C as the cleaning liquid, the ultrapure water supply system was cleaned in the same manner as in Examples 1 to 3, and then the ultrapure water produced by the system was sampled at the point of use to examine the water quality. The measurement results are shown in FIGS. 5 and 6.

Comparative Example 2

Using ultrapure water as the cleaning liquid, the ultrafiltration membrane was cleaned in the same manner as in Example 4, and then the number of fine particles in the ultrapure water produced by the cleaned system was measured. The measurement results are shown in FIG. 7.

Evaluation of Examples 1-5 and Comparative Examples 1-2

As is clear from FIG. 5, in the ultrapure water supply system cleaned by the cleaning methods according to Examples 1 to 3, the number of fine particles in the ultrapure water produced by the system dropped to a level lower than an allowable upper-limit value (1/mL) before a whole day passed since the start of operation of the system following the completion of the cleaning. Namely, the cleaning methods of Examples 1 to 3 proved to have high

fine particle removing capability. A cleaning method according to Example 5 also had excellent cleaning capability, though measurement results thereof are not illustrated. On the other hand, in the system cleaned by the method according to Comparative Example 1, more than eight days were required for the number of fine particles in the ultrapure water produced by the system to drop to a level lower than the allowable upper-limit value, and thus, it was found that the cleaning method of Comparative Example 1 had poor fine particle removing capability.

Also, as seen from FIG. 6, in Examples 1 to 3, the time required for the TOC of the ultrapure water produced by the system to drop to a level lower than an allowable upper-limit value (1 μg/L) was shorter than a whole day as counted from the start of operation of the system, proving that the cleaning methods of Examples 1 to 3 also have excellent organic matter removing capability. This is the case with Example 5 as well. On the other hand, in Comparative Example 1, it took four to five days for the TOC to decrease to a level lower than the allowable upper-limit value, and it was found that the cleaning method of Comparative Example 1 had poor organic matter removing capability.

Further, as is clear from FIG. 7, in Examples 1 and 4, the number of fine particles decreased to a level lower than 1/mL before a whole day passed since the start of operation of the system having the cleaned filtration membrane attached thereto. Especially, in the case of Example 4, the number of fine particles dropped to a level lower than 1/mL in 12 hours. On the other hand, in Comparative Example 2, the number of fine particles did not drop below 1/mL even after the lapse of 300 hours from the start of operation of the system.

CLAIMS

1. A cleaning method for cleaning at least part of an ultrapure water supply system having an ultrapure water production apparatus connected to a point of use of ultrapure water via a passage, comprising the steps of:

(a) changing surface potential of fine particles present in the at least part of the ultrapure water supply system; and

(b) discharging the fine particles from the at least part of the ultrapure water supply system to outside.

2. The cleaning method according to claim 1, wherein in said step (a), the fine particles are made to contact with a basic solution or a solution of surfactant.

3. The cleaning method according to claim 1, wherein in said step (a), the surface potential of the fine particles is changed and also physical force is applied to the fine particles.

4. The cleaning method according to claim 3, wherein in said step (a), a basic solution or a solution of surfactant is caused to flow through the at least part of the ultrapure water supply system at a flow velocity of 0.5 m/sec to 2.0 m/sec.

5. The cleaning method according to claim 3, wherein in said step (a), with a basic solution or a solution of surfactant kept in contact with the at least part of the ultrapure water supply system, the solution is applied with small-amplitude vibration.

6. The cleaning method according to claim 2, wherein the basic solution is an aqueous solution of ammonia or ammonium salt, or an aqueous solution of alkali metal hydroxide, or a mixture of the aqueous solution of ammonia or ammonium salt and the aqueous solution of alkali metal hydroxide.

7. The cleaning method according to claim 2 any one of claims 2, 4 and 5, wherein the basic solution is pure water or ultrapure water in which alkaline gas is dissolved.